



Work Instruction (WI)

DIRECTIVE NO. 540-WI-8710.3.1A
EFFECTIVE DATE: 05/24/2010
EXPIRATION DATE: 05/24/2015

APPROVED BY Signature: Original signed by:
NAME: Brian Montgomery
TITLE: RECERT Manager

COMPLIANCE IS MANDATORY

Responsible Office: 540/RECERT

Title: Certification/Recertification of Ground Based Pressure Vessels and Pressurized Systems

PREFACE

P.1 PURPOSE

This Work Instruction describes the step-by-step process to be used by Recertification Program (RECERT) personnel for the certification/recertification of ground based pressure vessels and pressurized systems (PV/S).

P.2 APPLICABILITY

This Work Instruction is applicable to PV/S certification/recertification activities at Greenbelt, MD, Wallops Flight Facility, VA and remote sites under Goddard management.

P.3 REFERENCES

NASA-STD-8719.17, NASA Requirements for Ground Based Pressure Vessels and Pressurized Systems (PVS)
GPR 8710.3, Certification and Recertification of Ground Based Pressure Vessels and Pressurized Systems (PV/S)

P.4 CANCELLATION

540-WI-8710.3.1, Certification of New or Modified Ground Based Pressure Vessels and Pressurized Systems (PV/S)
540-WI-8710.3.2 Recertification of Ground Based Pressure Vessel and Pressurized Systems (PV/S)

P.5 TOOLS, EQUIPMENT, AND MATERIALS

Typical tools, equipment, and materials used during the course of RECERT operations are, but are not limited to, safety glasses, hard hats, steel toed shoes, safety harnesses, gauge calibration units, relief valve calibration units, ultrasonic thickness equipment, dye penetrant equipment and materials, and magnetic particle test equipment and materials.

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P.6 SAFETY PRECAUTIONS AND WARNINGS

None

P.7 TRAINING

None

P.8 RECORDS

Record Title	Record Custodian	Retention
Test and Inspection Reports Discrepancy Reports	RECERT Manager at Greenbelt, Deputy RECERT Manager at WFF	NRRS*1/118A. Retire to an approved storage facility after 5 years. Destroy after 25 years.

* *NRRS – NASA Records Retention Schedule* ([NPR 1441.1](#))

P.9 MEASUREMENT/VERIFICATION

At the beginning of each calendar year, RECERT will have certified approximately 90% of PV/S required in accordance with applicable NASA requirements and standards.

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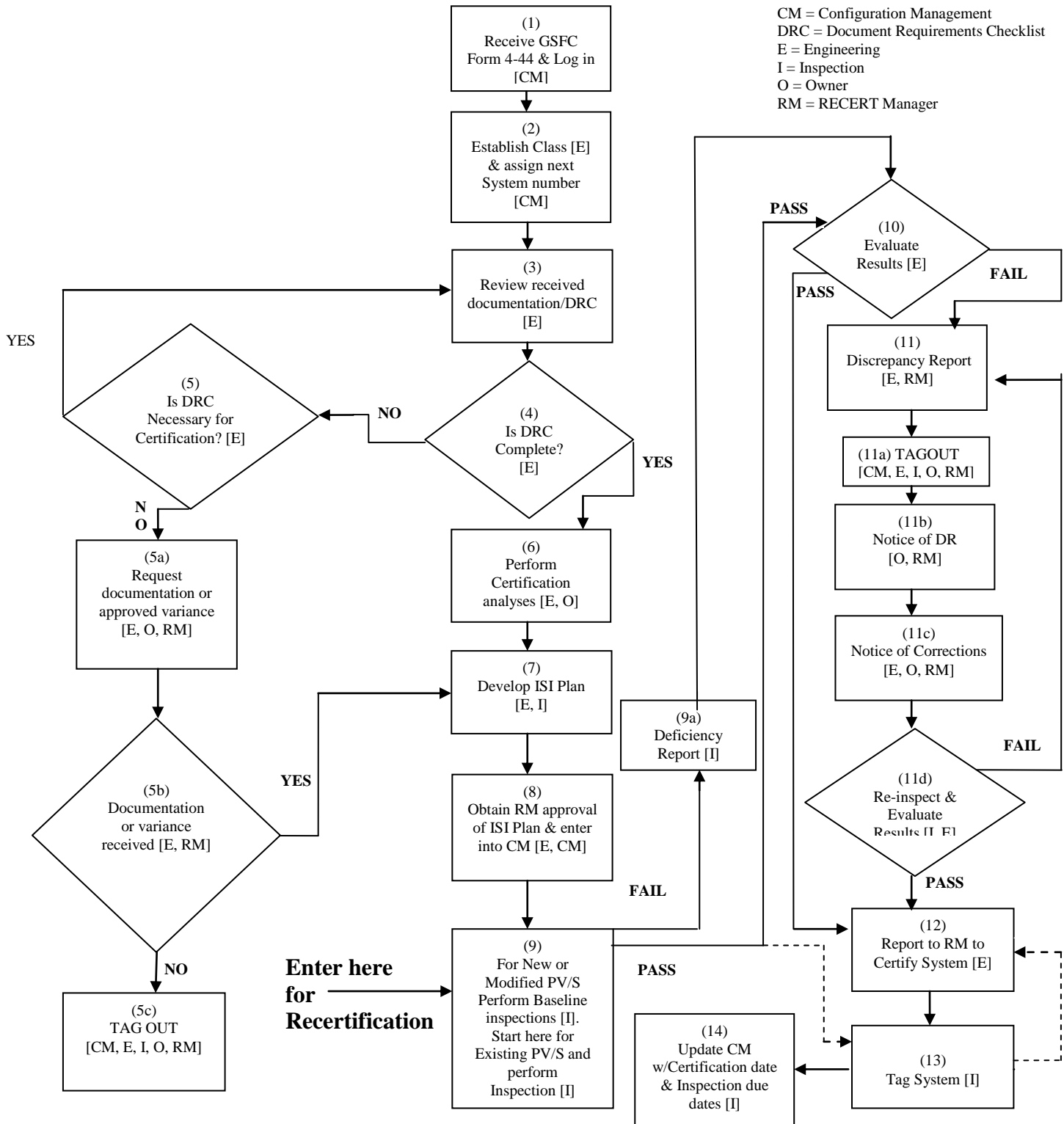
Instructions

In this document, a requirement is identified by “shall,” a good practice by “should,” permission by “may” or “can,” expectation by “will” and descriptive material by “is.”

The following flow chart describes the certification process for new and/or modified PV/S and the recertification process for existing PV/S. The certification process starts at step (1). The recertification process starts at step (9). Detailed explanations of each step follow the chart, with the number of each step corresponding to the number in parentheses in each block. The responsibility for each step is given in brackets as noted on the chart. The sample Documentation Requirements Checklist (DRC) referenced on the chart is shown in Appendix D. Sample Certification/Recertification and Inspection tags are shown in Appendix E.

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PV/S CERTIFICATION/RECERTIFICATION FLOW CHART



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The following STEPS are sequential unless noted otherwise.

1. Upon receipt of GSFC Form 4-44, the Configuration Management (CM) representative logs into the Configuration Management System (CMS), inputs this information, and forwards a copy of Form 4-44 to RECERT Engineering.
2. Engineering assigns a PV/S Classification and the CM representative assigns the next applicable system number (S-xxx; R-xxx; DN-xxx; DC-xxx, WA-xxx) based upon the PV/S class.
3. Engineering reviews the submitted documentation for completeness and code compliance and documents the review on the documentation requirements checklist (see Appendix D).
4. If the documentation is complete and acceptable, proceed to step 6. If not, proceed to step 5.
5. Engineering evaluates whether the missing documentation is necessary to perform certification analyses.
 - a. If the missing documentation is required to perform the analyses, Engineering will request the owner to provide the documentation or an approved waiver. All certification activities are suspended until the required documents or waiver is received.
 - b. When the missing documentation or approved waiver is received, go to step 7.
 - c. Engineering will inform the RM and system Owner that documentation is insufficient and/or the variance is unacceptable. The RM directs Inspection to lock out the system. Engineering notifies the CM representative of the system status and the CMS is updated.
6. Engineering performs the analyses necessary for certification based upon the received documentation. These analyses include the establishment of the original service life based upon relevant failure modes, the projected cyclic service, rate of degradation, damage mechanisms, and other appropriate factors. Risks shall be identified and assessed and a Risk Assessment Code (RAC) determined in accordance with paragraph 4.9.2 of NASA-STD-8719.17. Service life establishment, risk identification, and RAC determination may be performed jointly by Engineering and the Owner. Engineering establishes the periodicity of inspection cycles.
7. Engineering and Inspection performs and documents an initial comprehensive integrity assessment. The PV/S integrity assessment shall include an ISI plan that addresses credible damage mechanisms, and initially defines inspection methods and intervals to provide the necessary confidence that the PV/S will remain in a state of continuous compliance with the requirements of GPR 8710.3, NASA-STD-8719.17, and the applicable National Consensus Codes and Standards (NCS).
8. Engineering shall obtain RM approval of the ISI plan and certification analyses. When RM approval has been obtained, the CM representative shall enter the ISI plan into the CMS.

9. For certification, Inspection will issue an RWO for the CM Representative to enter in the CMS that includes the components to be inspected, the methods of inspection, ISI and NMP inspection requirements, and all outage documentation and safety requirements. Inspectors shall perform baseline inspections as described in the ISI or as specified by Engineering. For recertification, the same steps shall be followed and if there are any outstanding DRs, these items will be added to the inspection list.

If the system passes the certification/recertification process, proceed to step 10 and concurrently tag the system per step 13.

If the system fails the certification/recertification process, issue a deficiency report per step 9a and proceed to step 10.

10. Engineering evaluates the inspection results. If they are acceptable, proceed to step 12. If the results are unacceptable, i.e., the system or any component within the system fails to meet acceptance criteria, proceed to step 11.
11. As directed by the RM, Engineering issues a discrepancy report (DR) to the owner detailing the areas of non-conformance.
- a. The RM directs Inspection to lock out the system. Engineering notifies the CM representative of the system status and the CMS is updated
 - b. The RM notifies the Owner of the DR.
 - c. The Owner notifies Engineering of corrective actions.
 - d. Engineering directs Inspection to re-inspect the system and Engineering evaluates the results. If the results are acceptable, proceed to step 12. If unacceptable, return to the beginning of step 11.
12. Engineering issues a report to the RM recommending that the system be certified.
13. RECERT PV/S inspectors tag the system with certification tags and component inspection tags (see Appendix D).
14. The CM representative updates the CMS with the system certification date, component ISI due dates and any operational certification constraints resulting from initial system inspections.

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Appendix A – Definitions

None

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Appendix B – Acronyms

AIAA	American Institute of Aeronautics and Astronautics
ASME	American Society of Mechanical Engineers
CM	Configuration Management
CMS	Configuration Management System
DR	Discrepancy Report
DRC	Documentation Requirements Checklist
GPR	Goddard Procedural Requirements
ISI	In Service Inspection
NCS	National Consensus Codes and Standards
PV/S	Pressure Vessels and Pressurized Systems
RAC	Risk Assessment Code
RECERT	Recertification Program
RM	RECERT Manager
RWO	Recert Work Order

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Appendix C: PV/S Numbering System

PV/S CLASS	NUMBERING SYSTEM
Class A: ASME Code Compliant	S-xxx
Class B: Other Code Compliant	S-xxx
Class C: Non-Code PV/S	See Note 1
Class D: Ground Support Equipment (GSE)	NASA Owned: DN-xxx Contractor Owned: DC-xxx
Class E: Excluded PV/S	None
Class R: Research and Development PV/S	R-xxx
Class W: PV/S Operating Under an Approved Variance	WA-xxx

Note 1: S-xxx; DN-xxx; DC-xxx; R-xxx as applicable. The CM system shall indicate that the Systems in this Classification are Non-Code.

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Appendix D: Sample Documentation Requirements Checklist

	DOCUMENTATION ITEM	RECEIVED		
		YES	NO	N/A
1	System Description/Boundaries/Sketches			
2	Design and Operating Conditions			
3	Manufacturers Data Report (Vessels only)			
4	Material Specifications (ASTM or ASME)			
5	Pipe/Tubing Size			
6	Pipe/Tubing Wall Thickness			
7	Pipe/Tube Fitting Type and Class (socket weld, butt weld, threaded, mechanical (swage), etc.)			
8	Valve Type, Manufacturer, Model Number, Material of Construction (body, stem, seat(s)), pressure and temperature rating			
9	Overpressure Protection: Manufacturer, Model Number, Type, Size, Capacity, Set Point, Seat Material			
10	Pressure Regulators: Manufacturer, Model Number, Type (Single Stage, Dual Stage), Material, Size, Max Inlet Pressure, Max Outlet Pressure			
11	Pressure Gages: Manufacturer, Model Number, Inlet Size, Range			
12	As-Built Piping & Instrumentation Diagram (P&ID)			
13	Welding Procedure Specification (WPS) or Brazing Procedure Specification (BPS), including applicable Procedure Qualification Record (PQR)			
14	Copy of Welder Performance Qualification (WPQ) or Brazer Performance Qualification (BPQ)			
15	Filler Metal Designation and Type (AWS Specification)			
16	Record of Code-Required Nondestructive Testing (NDT)			
17	Heat Treatment Reports			
18	Record of Code-Required Pre-service Pressure Tests			

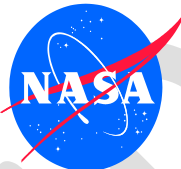
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Appendix D: Sample Certification/Recertification and Inspection Tags

Note: Typical GSFC Greenbelt tags are shown. WFF tags are similar but include WFF-specific designation and contact information.


**GODDARD SPACE FLIGHT CENTER
RECERTIFICATION PROGRAM
CERTIFIED**

In accordance with NASA requirements and GPR 8710.3, in-service inspections have been performed by RECERT Support on _____
to pressure system number: _____

The System is certified in accordance with the following applicable procedures.

_____ NMP-103, External Visual Examination

_____ NMP-106, Relief Valve Certification

_____ NMP-105, Pressure Gage Certification

_____ NMP-107, Relief Valve Lift Test

_____ NMP-114, Flex Hose Functional Test

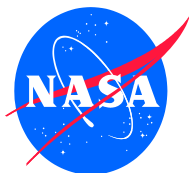
_____ NMP-123, Leak Test

If there is a problem with or a question regarding this vessel, contact
RECERT Support at extension: (301) 286-5181.
Report Number: _____ Due Date: _____

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GODDARD SPACE FLIGHT CENTER RECERTIFICATION PROGRAM CERTIFIED

In accordance with NASA requirements and GPR 8710.3, in-service inspections have been performed by RECERT Support on _____ to pressure system number: _____

The System is certified in accordance with the following applicable procedures.

NMP-101, Magnetic Particle Test
NMP-102, Liquid Penetrant Test
NMP-109, Ultrasonic Thickness Test
NMP-111, Liquid Penetrant Test
NMP-113, Magnetic Particle Test

If there is a problem with or a question regarding this vessel, contact RECERT Support at extension: (301) 286-5181.
Report Number: _____ Due Date: _____

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**GODDARD SPACE FLIGHT CENTER
RECERTIFICATION PROGRAM
CERTIFIED**

SYSTEM NO: _____

MAC NO: _____

UPV NO: _____

MAWP/MDP: _____ PSI @ _____ ° F

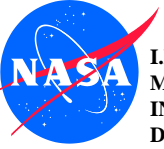
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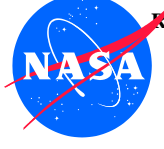
RECERT SUPPORT: (301) 286-5181

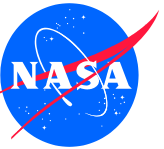
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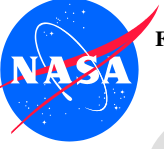
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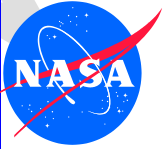
	GODDARD SPACE FLIGHT CENTER RECERTIFICATION PROGRAM CERTIFIED GAGE CALIBRATION TAG	
	I.D. #	_____
	MAWP:	ACCUR: _____
	INSPECTION DATE:	_____
	DUE DATE:	_____
	REPORT #	_____
	INSPECTOR:	_____
	RECERT SUPPORT:	(301) 286-5181

	GODDARD SPACE FLIGHT CENTER RECERTIFICATION PROGRAM CERTIFIED RELIEF VALVE INSPECTION TAG	
	I.D. #	_____
	SET PRESSURE:	_____
	INSPECTION DATE:	_____
	DUE DATE:	_____
	REPORT #	_____
	INSPECTOR:	_____
	RECERT SUPPORT:	(301) 286-5181

	GODDARD SPACE FLIGHT CENTER RECERTIFICATION PROGRAM CERTIFIED GAGE VT INSPECTION TAG	
	I.D. #	_____
	MAWP:	_____
	INSPECTION DATE:	_____
	DUE DATE:	_____
	REPORT #	_____
	INSPECTOR:	_____
	RECERT SUPPORT:	(301) 286-5181

	GODDARD SPACE FLIGHT CENTER RECERTIFICATION PROGRAM CERTIFIED FLEX HOSE INSPECTION TAG	
	I.D. #	_____
	MAWP:	_____
	INSPECTION DATE:	_____
	DUE DATE:	_____
	REPORT #	_____
	INSPECTOR:	_____
	RECERT SUPPORT:	(301) 286-5181

	GODDARD SPACE FLIGHT CENTER RECERTIFICATION PROGRAM CERTIFIED FLEX HOSE VT INSPECTION TAG	
	I.D. #	_____
	INSPECTION DATE:	_____
	DUE DATE:	_____
	REPORT #	_____
	INSPECTOR:	_____
	RECERT SUPPORT:	(301) 286-5181

	GODDARD SPACE FLIGHT CENTER RECERTIFICATION PROGRAM CERTIFIED AIR PAD VT INSPECTION TAG	
	I.D. #	_____
	MAWP:	_____
	INSPECTION DATE:	_____
	DUE DATE:	_____
	REPORT #	_____
	INSPECTOR:	_____
	RECERT SUPPORT:	(301) 286-5181

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CHANGE HISTORY LOG

Revision	Effective Date	Description of Changes
Baseline	02/03/2005	Initial Release
A	05/24/2010	Updated to new WI format. Incorporated 540-WI-8710.3.2 into this document. Updated flowchart and steps to reflect new workflow. Corrected section P.6. Added watermarks to sample documentation requirements checklist and tags.

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